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ABSTRACT

The two studies reported here examined processes involved in learning and remembering sentences. Experiment one identified processes in sentence acquisition, and experiment two analyzed memory for sentences one week after initial learning. Subjects for the experiments were students in a college educational psychology class. The experiments demonstrated that when subjects provide a word to complete a sentence, they learn more of the experimenter's sentences than a reading-only control group. This facilitation occurs regardless of the match between the word supplied by the subject and the one chosen by the experimenter. There was no evidence of a negative transfer for a sentence completion task to learning the experimenter's sentence in an undetermined sentence group. However, experiment two showed that the difference between the subject's and the experimenter's sentence does have consequences on delayed retention tests. Performance on both delayed recall and delayed recognition tests showed interference from the non-matching words supplied during the study trial in an undetermined sentence completion group. Results of this experiment suggest instructional possibilities in the situation where a student is presented with a question and answers it incorrectly. (MKM)

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INTERFERENCE EFFECTS IN MEMORY FOR SENTENCES

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The two studies reported here examined processes involved in learning and remembering sentences. Experiment I identified processes in sentence acquisition, and Experiment II analyzed memory for sentences one week after initial learning.

Recent research on learning from sentences and prose passages demonstrates that subjects encode the particular words in a sentence in a specific way as a function of both the words in the sentence and the subject's knowledge of the world (Anderson and Ortony, 1975; Bransford and Johnson, 1973; Kintsch, 1972). A previous study demonstrated that when the experimental task required subjects to call to mind the meaning of the words in a sentence, subjects learned more than when they were instructed to read a sentence aloud (Anderson, Goldberg, and Hidde, 1971). In that study, subjects studied Determined Sentences - sentences for which the last word was determined by the sentence context. Sentences were constructed so subjects consistently supplied the same last word to complete the sentence. (For example, all subjects supplied the word "desk" to complete this stem: "The executive went to shop for a large oak _____.") Subjects in the Sentence Completion Condition learned more sentences than subjects in the Reading Only Control Group which was instructed to read the entire sentence aloud during the study trial.

In the studies reported here, learning and recall of Undetermined

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Sentences as well as Determined Sentences is examined. For Undetermined Sentences, the word supplied to complete the sentence is unique to each subject. (For example, to complete the stem "The executive went to buy a new _____," many different words were supplied including "tie," "car," "suit," "briefcase," and "pen.") In the studies reported here, subjects in the Sentence-Completion Condition for the Undetermined Sentence Group first supplied a word to complete the sentence and then were shown the sentence with the word the experimenter had chosen to complete the sentence. They were told to try to guess the word the experimenter had chosen to complete the sentence and then to learn the experimenter's version of the sentence. Experiment I compares the acquisition of Undetermined Sentences with the acquisition of Determined Sentences, and Experiment II compares memory for Determined and Undetermined Sentences one week after learning.

EXPERIMENT I

In order to supply a word to complete a sentence, the subject must construct a specific representation of the sentence stem. For Determined Sentences, this Sentence Completion Task facilitated sentence learning compared to a Reading Only Control Group. Experiment I tested the hypothesis that the Sentence Completion Task will disrupt sentence learning when the word supplied by the subject does not match the word the experimenter used to complete the sentence. This prediction is based on the assumption that the meaning assigned to a sentence stem varies with the last word of the sentence (Anderson and Ortony, 1975). For example, the stem "The monkey squeezed the old _____," is assumed to be interpreted one way for the subject who supplied "zookeeper" but a different way for the experimenter who supplied "banana." If the interpretation assigned by the subject is different from that

used in the experimenter's version of the sentences, [illegible] version is expected to be disrupted.

In order to test this hypothesis, subjects memorized lists of sentences in Determined Lists (24 Determined Sentences), Undetermined Lists (24 Undetermined Sentences), or Mixed Lists (12 Determined Sentences and 12 Undetermined Sentences). It was expected that subjects learning the Determined List would learn the most sentences, subjects learning the Undetermined List would learn the fewest sentences, and subjects learning the Mixed List would learn an intermediate number of sentences.

A Reading Only Control Group was included to assess what any differences observed between List Types for the Sentence Completion Task were due to differences in the relative difficulty of the lists.

Method

Subjects and Experimenters

Ninety-six undergraduate students enrolled in an introductory psychology course participated in this study to fulfill part of the course requirements. The subjects were randomly assigned to experimental conditions at the time of testing, with the restriction that all cells of the design included the same number of subjects before another subject was added to the cell.

Seven experimenters - six students in educational psychology with no previous research experience and this author - administered the treatment conditions. Each experimenter rehearsed the procedure with at least three practice subjects, until he felt he had mastered the routine. All experimenters administered most of the treatment conditions, but the number of subjects run each particular condition assigned to the experimenters was not controlled.

Materials

Three types of lists of sentences were used in this study: Lists of Determined sentences, lists of Undetermined sentences, and Mixed lists.

The Determined sentences were chosen from sentences used in a earlier study (Anderson, Goldberg, and Hidde, 1971). In that study, undergraduates were presented with sentences that had a blank in place of the last word and were instructed to complete the sentence with the word that "most obviously fit the meaning of the sentence." A sentence was considered Determined if 97% - 100% of this norming population used the same word to complete the sentence.

For the study reported here, a set of Undetermined sentences was created. These sentences used the same subject noun-last word pairs as the Determined sentences, but each pair was embedded in a different sentence context so the last word could not be predicted from the first part of the sentence. In order to verify that the last word was undetermined, the sentences were given to fifty-one students enrolled in an introductory educational psychology class. The sentences had a blank in place of the last word, and the students were instructed to fill in a word that sensibly completed the sentence. Two criteria defined the sentences chosen from the results of the norming procedure: No more than 50% of the norming population filled in the blank with the same word, and no more than 50% of the norming population used the word the experimenter had chosen as the "correct" word. These criteria yielded a set of 48 sentences from the 63 that had been normed.

The 48 Undetermined sentences were arranged in two lists of 24 (List A and List B) with care to minimize intra-list similarity. Then the Determined sentences were arranged into two parallel lists. In addition, Mixed Lists, each consisting of 12 Determined and 12 Undetermined sentences, were created. The order of items in these lists conformed to the order in the other two lists. Whether a sentence in the Mixed List was Determined or Undetermined was a

random event, with the restriction that 12 items of each type appeared in each list and that no more than three items of one type occurred sequentially. Two forms of the Mixed Lists were used: Form 2 was the complement of Form 1; that is, the sentences that were Determined in Form 1 were Undetermined in Form 2, and the sentences that were Undetermined in Form 1 were Determined in Form 2. Appendix A presents the items in List A and List B for each list type.

Test items included the subject noun of each sentence and the last word of each sentence. Each of these cue words was presented on a 3 X 5 index card.

Procedure

Each subject completed two practice items before studying the first list.

Subjects in the Sentence Completion Condition saw a sentence typed on an index card with the subject noun underlined and a blank in place of the last word. This sentence was presented for four seconds while the subject read the sentence aloud and tried to guess the word the experimenter had chosen to complete the sentence. Then the completed sentence was presented for two seconds and subjects read the correct last word aloud. The presentation of the sentences was paced by beeps from a tape recorder. After all the sentences in the first list had been presented once, the subject completed two tests. For the Forward Test, he was given a stack of index cards with the subject noun from one sentence typed on each card. The subject read the word aloud and then reported the last word of that sentence. The test was self paced - each subject could spend as much time on any item as he chose, however, he could not return to any item once he had passed it. For the Backward test, the set of index cards presented the last word of the sentence and the subject was to report the subject noun of the sentence. This test was also self-paced.

After the two tests were completed, the second list of sentences was presented followed by the same two types of tests in the same order.

Subjects in the Reading Only Group saw each sentence for six seconds so the study time for the two treatment groups would be equal. During this interval, subjects read the sentence aloud once. After six seconds, signaled by a beep from a tape recorder, the experimenter turned to the next index card. After the 24 sentences from the first list had been presented, the subject completed two tests and then continued with the second list and the tests.

The order of the two lists was counterbalanced across subjects and within experimental conditions, and the order of items within each list was constant for all subjects. The order of the two tests was counterbalanced across subjects and within each experimental treatment. The order of items within each test was constant for all subjects: The first 12 test items were a random arrangement of the first half of the list, and the second 12 items were a random arrangement of the second half of the list. This arrangement minimizes effects of short-term memory on recall performance (Nelson, 1970).

Results

The data from Experiment I was analyzed using a 2 X 3 X 2 X 2 analysis of variance. The factors and levels defining each factor were: Experimental Task (Sentence Completion versus Reading Only), List Type (Determined, Undetermined, and Mixed), List Position (First List versus Second List) and Test (Forward versus Backward).

THe analysis identified a significant main effect for List Position ($F(1,72 = 15.35$, $p < .01$) and a significant Experimental Task X List Position interaction ($F(1,72) = 12.87$, $p < .05$). This interaction is pictured in Figure 1. Subjects in the Sentence Completion group recalled more sentences than subjects in the Reading-Only group on the first list, but this difference did not appear on the second list.

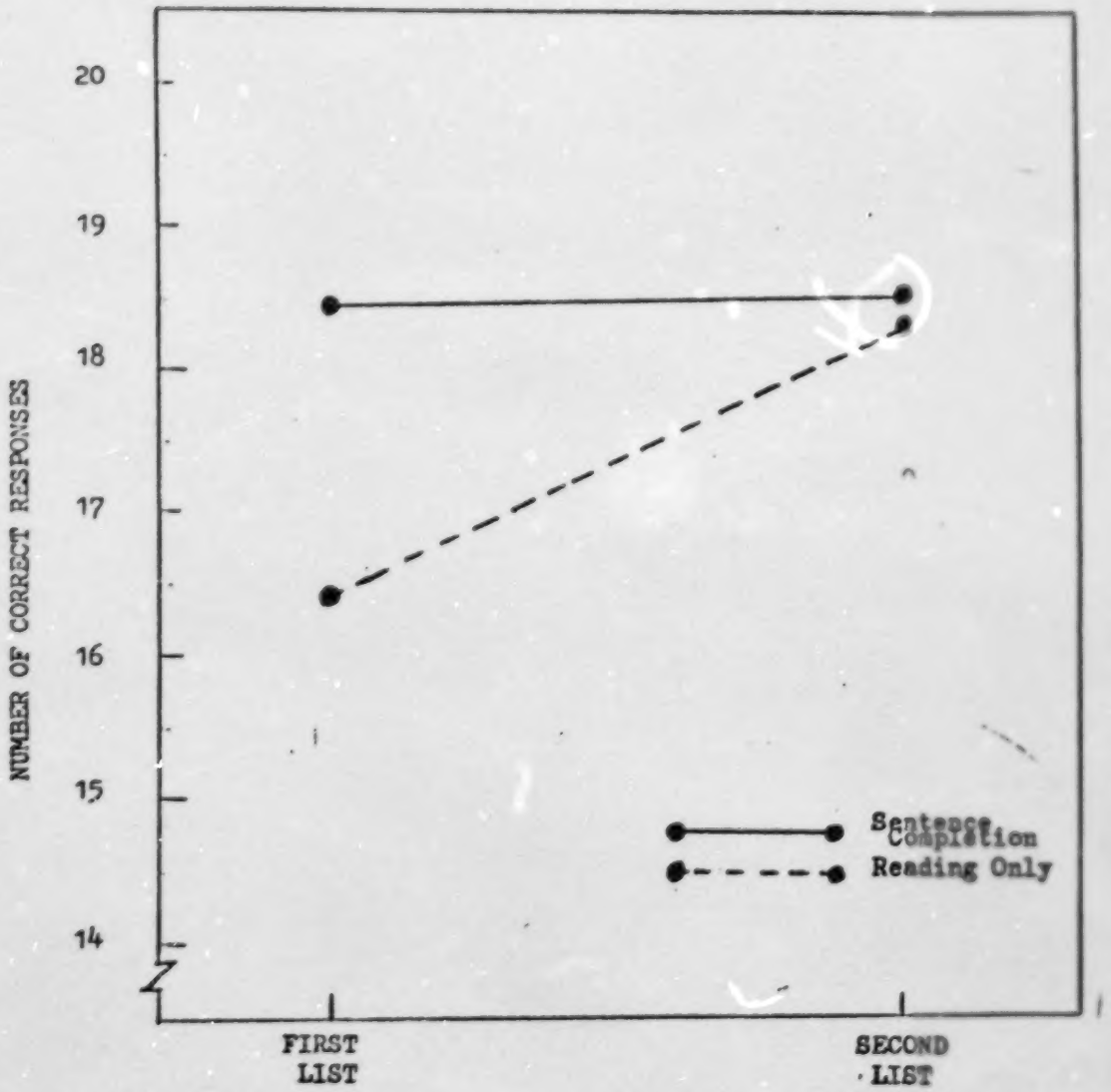

Figure 1 Mean performance as a function of Experimental Task and List Position.

The significant effect of the List Position factor indicates that practice on the first list influences performance on the second list. After completing the study and test trial for the first list, the subject has some information about the effectiveness of his study behaviors and may modify these procedures before studying the second list. Although the experimenter attempted to control study strategies by directions to the subject, first list performance also influenced study strategies on the second list. While this experiment does not directly examine the kinds of changes in study strategies that occurred from List 1 to List 2, the results suggest that changes did occur.

Because of the interaction of Experimental Task and List Position, only performance on the First list is examined in detail. Recall scores are presented in Table I. There is a significant main effect for Experimental Task ($F(1,72) = 19.95$, $p < .01$), but the main effect for List Type and the Experimental Task X List Type interaction were not significant. The Sentence Completion Task facilitates sentence learning, and this facilitation occurs regardless of the match between the word supplied by the subject and the word supplied by the experimenter.

There is a significant main effect for Test, with performance on the Forward Test consistently higher than performance on the Backward Test. However, there is no significant Test X Experimental Task interaction. The lack of an interaction argues against the hypothesis that the Sentence Completion Group scores higher than the Reading Only group on the Forward Test because there is a closer match between the study conditions and the test conditions for this group. Since performance on the Backward Test for the Sentence-Completion Group also surpasses the Reading Only Group's performance, it seems test performance does measure differences in amount learned rather than positive transfer from study to test trials. (This finding is also reported in Anderson, Goldberg, and Hidde, 1971)

TABLE I

MEAN PERFORMANCE ON RECALL TESTS FOR LIST ONE
AS A FUNCTION OF LIST TYPE AND EXPERIMENTAL TASK

		List Type		
Experimental Task	Test	Determined	Undetermined	Mixed
Sentence Completion	Forward	20.4	20.7	19.9
	Backward	16.6	16.7	16.5
Reading Only	Forward	18.5	17.7	18.7
	Backward	14.3	14.1	14.7

In summary, the results of Experiment I confirm the previous finding that learning of sentences is facilitated when the experimental task requires the subject to construct his own interpretation of a sentence. It extends earlier work by demonstrating that this facilitation occurs even when the subject's personal interpretation of the sentence does not match the one specified by the experimenter. The hypothesis that the Sentence Completion Task would disrupt sentence learning when the subject did not complete the sentence with the same word the experimenter used was not confirmed.

EXPERIMENT II

The unexpected results of Experiment I prompted a re-examination of the Sentence Completion Task. This task can be analyzed using concepts from research with paired-associates. Subjects in the Undetermined Sentence Completion Group are presented with a sentence stem, A, and supply a word to complete the sentence, B. Then they are shown the same stem, A, with the experimenter's word, C, completing the sentence. For the Undetermined Sentence Completion Group the experimental task can be represented as A-B, A-C. In contrast, the experimental task for the Determined Sentence Completion Group can be represented as A-C, A-C, since the sentences are constructed so the words supplied by the subject match those chosen by the experimenter. The prediction that the Undetermined Sentence Completion Group will learn fewer sentences than the Determined Sentence Completion Group is essentially a prediction of negative transfer from A-B to A-C.

Learning a set of A-B pairs often retards the learning of a second set of pairs composed of the same stimuli but different responses, but this is not always the case. Martin's encoding variability hypothesis (Martin, 1967) proposed that when the functional encoding of A was the same for both lists, negative transfer would occur, but when different encodings of A were used for

the two lists, negative transfer would not occur. This hypothesis could explain why there was no negative transfer for the Undetermined Sentence Completion Group in Experiment I, since it was assumed that subjects would construct a unique encoding for the sentence stem while studying the experimenter's sentence. However, direct tests of Martin's hypothesis have not supported it (Martin, 1972; Mueller, Brown, and Kausler, 1975) and one study reported positive transfer for subjects who retained their original encodings in learning List Two (Ellis, 1972, p. 174). At the present time, no statements can be made about the extent to which subjects will switch or retain the functional encoding of a stimulus, the variables that control this strategy, and the consequences for performance on a transfer task. It is noted that the results of Experiment I are in keeping with performance in A-B, A-C transfer tasks.

The analysis of the Sentence Completion Task in terms of paired-associate paradigms can be used to make predictions about performance on a retention test. Since both the Determined and the Undetermined Sentence Completion Groups are instructed to learn the experimenter's sentence, the task for the former group is A-C, A-C, recall A-C and the task for the latter group is A-B, A-C, recall A-C. These two groups represent the classic proactive inhibition paradigm. Recall test performance for the Undetermined Sentence Completion Group should suffer from interference from A-B. Since proactive interference effects increase with the length of the interval between learning A-C and recalling A-C, these effects would not be apparent on the immediate recall test used in Experiment I. Experiment II tested the hypothesis that the Undetermined Sentence Completion Group would score lower on a delayed retention test that the Determined Sentence Completion Group because of interference from the words the subjects supplied during the study trial.

Method

Subjects and Experimenters

Fifty-two undergraduate students enrolled in an introductory educational psychology course participated in this study to fulfill part of the course requirements. Two students were eliminated from the sample because they did not return for the retention test, three were eliminated because they did not follow the directions, and three were randomly eliminated from the Determined Sentence-Reading Only Group to result in a balanced design with eleven subjects in each cell.

Subjects were randomly assigned to experiemental treatments when they arrived for the experiment. Three advanced graduate students assisted the author in running subjects, with each experimenter testing approximately the same number of subjects from each group.

Design

The study used a 2 X 2 analysis of variance design with factors of Experimental Task and Sentence Type. As in Experiment I, the factor of Experimental Task included Sentence Completion and Reading Only Groups. The factor of Sentence Type included two levels: Determined Sentences and Undetermined Sentences.

Materials

SENTENCES From the forty-eight Undetermined sentences used in Experiment I, thirty were selected to minimize similarities among subject noun-last word pairs. (For example, One sentence used the word child as the subject, and another used children as the subject, so one of these was eliminated.) For the Undetermined

Sentences that were selected, the average proportion of norming group subjects who supplied the experimenter's word to complete the sentence was .05.

The set of Determined Sentences consisted of the the same subject noun-last word pairs, but used a different context so the last word was consistently predicted from the sentence stem.

TESTS For the immediate and the delayed recall tests, the subject noun from each sentence was presented on a separate index card and subjects were instructed to report the last word of the corresponding sentence. Since the Determined and the Undetermined Sentences were constructed from the same set of subject noun-last word pairs, the test items were identical for all groups and the response scored as correct for each subject noun was the same for all groups. The order of test items was random, with the restriction on the immediate test that the first half of the test included only items from the first half of the study list.

For the delayed recognition test, the subject noun of a sentence was presented on an index card along with four alternative responses. The alternatives included 1) the correct response, 2) a correct response to another item, 3) the most frequently reported incorrect response for the Undetermined form of the sentence, and 4) the most frequently reported incorrect response for the Undetermined form of another randomly determined sentence. A special for of the delayed recognition test was created for each subject in the Undetermined Sentence-Completion Group. Alternatives 3 and 4 were replaced with the word the subject had reported during the study interval for the corresponding item. This procedure was necessary since interference effects are not evident on a recognition test unless the particular competing responses are among the alternatives (Anderson and Watts, 1972). The alternatives were arranged in a random order for each test item, and the order of items within the test was identical for all subjects.

Procedure

Each subject completed two practice items before studying the set of thirty sentences. The sentences were presented one at a time in the window of a memory drum. Subjects in the Reading-Only group saw the entire sentence for eight seconds, while subjects in the Sentence-Completion group saw the sentence with a blank in place of the last word for four seconds and then the completed sentence for four seconds.

In the Sentence Completion Group, subjects read the entire sentence stem aloud and tried to guess the word the experimenter had chosen to complete the sentence. The experimenter recorded the subject's response. After four seconds, the completed sentence was presented for another four seconds, and the subject read the entire sentence aloud.

In the Reading-Only group, the entire sentence appeared in the window of the memory drum for eight seconds and each subject read it aloud during this interval.

After all thirty sentences had been presented, the subject completed the immediate recall test. Each subject was given a stack of cards with the subject noun from one sentence typed on each card. The subject read the word aloud and then reported the last word of the sentence. The test was self paced, and the subject could not return to any item after moving on to the next card. After completing the recall test, subjects were asked to return at the same time a week later for another experiment. Some subjects asked if the experiment would cover the same material. They were told the procedures would be similar but not identical.

The night before the delayed tests, each subject was called to remind him of his appointment. At the second session, each subject was present with a recall test and a recognition test. The subjects in the Undetermined Sentence-

Completion Group also completed a second recognition test using the same test items as the first recognition test. On this second test, they were asked to identify the response they had supplied during the study trial, rather than the one the experimenter had designated.

After the tests, the purpose of the experiment was briefly explained to each subject.

RESULTS

Table II presents the mean score for each experimental group on each test, and Table III summarizes the conditional probability of a correct response, given a history of specific patterns of correct and wrong responses to that item.

Immediate Recall Test

A 2 X 2 analysis of variance of immediate recall scores identified a significant main effect for Experimental Task ($F(1,40)=13.35$, $p<.01$), but no effect for Sentence Type and no significant interaction effect. The results of Experiment II's immediate recall test replicate the findings of Experiment I. The significant main effect for Experimental Task shows that when subjects supplied a word to complete a sentence, learning was facilitated, regardless of the match between the subject's word and the experimenter's word. The absence of an effect for Sentence Type suggests that both lists are "equally learnable," and any differences between the different Sentence Types can not be explained with the argument that the differences in sentence contexts made one set of sentences easier to learn than the other.

Subjects in the Undetermined Sentence Completion Group were expected to complete the sentences with words other than those chosen by the experimenter. This did not occur for each item, however. Occassionally the subject used the same word chosen by the experimenter ($\bar{X} = 2.82$), while at other times the subjects did not report any word during the study interval ($\bar{X} = 4.36$). Any

TABLE 1

MEAN SCORES ON CLOZE TEST FOR EXPERIMENT 1

Experimental task	Sentence Type	[illegible]	[illegible]	[illegible]
Sentence Completion	Determined	[illegible]	[illegible]	[illegible]
	Undetermined	[illegible]	[illegible]	[illegible]
Reading Only	Determined	[illegible]	[illegible]	[illegible]
	Undetermined	[illegible]	[illegible]	[illegible]

effects of competition would be evident only for those items where the subjects reported a different word during the study trial.

Subjects in the Determined Sentence Completion Group were expected to fill the blank with the word chosen by the experimenter, but occassionally they suggested a different word during the study trial ($\overline{X} = 0.73$). In order to examine the interference hypothesis more precisely, only those items in which the subject's response matched the experimenter's response were included in an analysis.

For the Undetermined Sentence Completion Group, the conditional probability of reporting a correct response on the immediate test, given that a wrong response was reported during study was computed ($P(I_c|S_w)$). This was compared with the conditional probability of reporting a correct answer on the immediate test given that the correct word was reported during the study trial ($P(I_c|S_c)$) for the Determined Sentence Completion Group. If supplying different words results in negative transfer to the task of learning the experimenter's sentence, the Undetermined Sentence Completion Group should recall proportionately less of the items that fit the interference paradigm than subjects in the Determined Sentence Completion Group. That is, $P(I_c|S_w) \quad P(I_c|S_c)$.

Since the scores in this analysis are proportions, most of which are above .90, the adjusted arcsine transformation recommended by Winer (1962, p.221) was used to transform the scores. A t-test of these transformed scores resulted in $t = -.30$, a nonsignificant result. It can be concluded that when the subject comprehends a sentence stem in order to supply a word to complete the sentence, the match between the subject's and experimenter's word does not influence acquisition of the experimenter's word.

Delayed Recall Test

The analysis of variance for this set of scores also shows a significant main effect for the Experimental Task ($F(1,40) = 13.18$, $p < .01$), but no significant

effect for Sentence Type of the interaction. The task requiring subjects to comprehend the sentence results in higher retention test scores than the Reading Only Control Group after a one week retention interval.

A more sensitive test for interference effects compares the conditional probability of recall, given the particular conditions for interference are present. Within the Undetermined Sentence Completion Group, the conditional probability of recall on the delayed test, given that a wrong response was supplied during the study trial and the correct response was given on the immediate recall test was computed for each subject ($P(D_c|S_wI_c)$). This is the particular condition in which interference effects are expected since the subject reports A-B during the study trial and had learned A-C as evidenced by his performance on the immediate test. If the subject did not correctly answer the item on the immediate test, or if he matched the experimenter's word during the study trial, the specific conditions for interference were not met.

For the Determined Sentence Completion Group, the conditional probability of correct delayed recall, given that the correct response was reported during the study trial and a correct response was given on the immediate test was computed for each subject ($P(D_c|S_cI_c)$). This is the particular condition where no interference effects are expected and serves as a comparison for the performance of the Undetermined Sentence Completion Group.

If the words the subject supplied during the study trial serve as a source of interference for recall of the experimenter's response, recall should be lower in the Undetermined Sentence Completion Group:
$P(D_c|S_wI_c) < P(D_c|S_cI_c)$.

As Table III shows, the group completing Undetermined Sentences recalled an average of 44% of the sentences, while the group completing the Determined

Sentences averaged 58% recall. A statistical comparison of these proportions resulted in $t(20) = 1.77$, $p < .05$. The average proportion recalled in the Undetermined Sentence Group was significantly less than the average proportion recalled in the Determined Sentence Group.

To further document the effect of interference from words reported during the study trial, the errors on the retention test were itemized. Of the overt errors, 29% were words supplied during the study interval. This averaged to 1.45 obviously interfering items per subject.

Delayed Recognition Test

On the delayed recognition test, subjects were presented with the subject noun of a sentence plus four alternative responses. One of the distractors for subjects in the Undetermined Sentence Completion Group was the specific word they had supplied to complete the sentence during the study trial. For the Determined Sentence Completion Group, this distractor was the word most frequently supplied to the parallel form of the Undetermined Sentence. The analysis of variance for these scores shows no significant main effects, but the interaction of Experimental Task X Sentence Type is significant. An a posteriori comparison (Winer, 1962, 207-211) of the differences in cell means shows the difference between performance in the Determined Sentence Completion Condition and the Undetermined Sentence Completion Condition does not reach conventional levels of significance ($F(3,40) = 7.90$; the critical value for this a posteriori analysis with $\alpha = .05$ is 8.52).

Conditional probabilities of recall were compared for the particular interfering items in the Undetermined Sentence Completion Group and the particular non-interfering items in the Determined Sentence Completion Group. If interference is a factor in recognition memory for sentences, $P(D'_c|S_wI_c) < P(D'_c|S_cI_c)$. The Determined Sentence Group did recall a larger

proportion of the items (.92) than the Undetermined Sentence Group (.85), and this difference was statistically significant with $t(20) = 1.78$, $p < .05$.

Itemizing all the errors for these groups, 93% of the errors for the Undetermined Sentence Group were choices of the words reported during the study interval. In contrast, only 67% of the errors for the Determined Sentence Group were made to this distractor. Almost all of the errors in the Undetermined Sentence Group were choices of the words they had supplied on the study trials.

Second Recognition Test for the Undetermined Sentence Completion Group

Subjects in this group repeated the recognition test, this time with instructions to identify the word they had supplied during the study trial. The average probability of recognizing the word reported during the study trial, given the specific conditions for interference ($P(D''_c S_w I_c)$) was .68, demonstrating that alternative words are remembered and can be distinguished for as long as one week after a single study trial.

DISCUSSION

Experiments I and II demonstrate that when subjects provide a word to complete a sentence, they learn more of the experimenter's sentences than a Reading-Only Control Group. This facilitation occurs regardless of the match between the word supplied by the subject and the one chosen by the experimenter. There is no evidence of negative transfer from the Sentence Completion task to learning the experimenter's sentence in the Undetermined Sentence Group. Experiment II shows that the difference between the subject's and the experimenter's sentence does have consequences on delayed retention tests. Performance on both delayed recall and delayed recognition tests showed interference from the non-matching words supplied during the study trial in the Undetermined Sentence Completion Group.

The results of Experiment I and II parallel results from research with paired associates. The task of the Undetermined Sentnece Completion Group can be represented as A-B, A-C, recall A-C, while the task of the Determined Sentence Completion Group can be represented as A-C, A-C, recall A-C. Comparing these two groups is the paradigm for demonstrating proactive inhibition; responses learned on the first list compete with recall of responses learned on the second list. The results confirm that this model from paired-associate research accurately predicts relative performance on delayed retention tests.

Examining performance on the Delayed Recall test shows that one week after learning the Sentence Completion Group scores higher than the Reading Only Control Group, as they did on the test immediately after learning. Even the Undetermined Sentence Completion Group whose performance suffers from interference effects recalls more than its Reading-Only Control. It is tempting to conclude that the advantage to be gained from tasks requiring the subject to construct his own representation for a sentence will outweigh any performance decrements due to interference effects, but this conclusion is not warranted until studies are completed using a wide variety of materials and a number of different retention intervals.

It is important to note that there is no difference in performance on the immediate test for the Determined and Undetermined Sentence Completion Groups. The task of constructing a particular representation of the sentence stem does not disrupt acquisition of the experimenter's sentence. While recall of the experimenter's sentence is subject to interference from the subject's sentence, this interference can be minimized in a number of different ways.

This task used in these studies suggests the instructional situation

where a student is presented with a question and answers it incorrectly. Results here suggest that if the student is then provided with the correct answer, he will be able to learn the answer, but both the student's answer and the correct answer will compete on a retention test. One way to avoid or minimize this interference would be to prevent errors by carefully structuring the questions within a precise instructional sequence. Another way to minimize interference effects would be to provide practice with the question and the correct response any time the student answers a question incorrectly. The Distar Reading Program includes such an error correction procedure. When a child or group of childrenrespond incorrectly to a question, the teacher is instructed to give the correct response and then to repeat the question and have the students supply the answer. Siegal (1973) showed that teachers who consistently used this sequence had classes who scored higher on unit achievement tests than teachers who did not consistently use this correction paradigm. In addition, when the relatively ineffective teachers were trained in the use of the correction sequence, their classes scored higher on an achievement test than classes of matched, untrained teachers.

These studies demonstrate that findings from research in paried association are useful for predicting and interpreting learning and memory for sentences.